

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problems Mailbox.**

**This Page Blank (uspto)**

# UK Patent Application GB 2 306 210 A

(43) Date of A Publication 30.04.1997

(21) Application No 9619409.7

(22) Date of Filing 17.09.1996

(30) Priority Data

(31) 9520855

(32) 11.10.1995

(33) GB

(51) INT CL<sup>6</sup>  
F26B 3/30

(52) UK CL (Edition O )  
F4G G9RC

(56) Documents Cited  
WO 95/07443 A1

(58) Field of Search  
UK CL (Edition O ) F4G G9BT G9RC  
INT CL<sup>6</sup> F26B 3/30  
ONLINE:WPI

(71) Applicant(s)

Edwin Trisk Systems Limited

(Incorporated in the United Kingdom)

Pallion Industrial Estate, Pallion, SUNDERLAND,  
Tyne & Wear, SR4 6SN, United Kingdom

(72) Inventor(s)

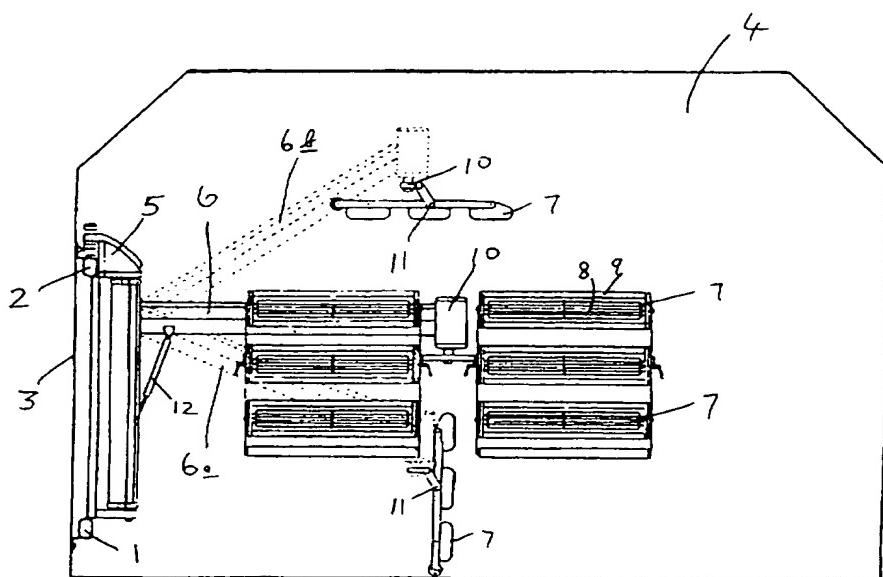
Gordon Boyd

(74) Agent and/or Address for Service

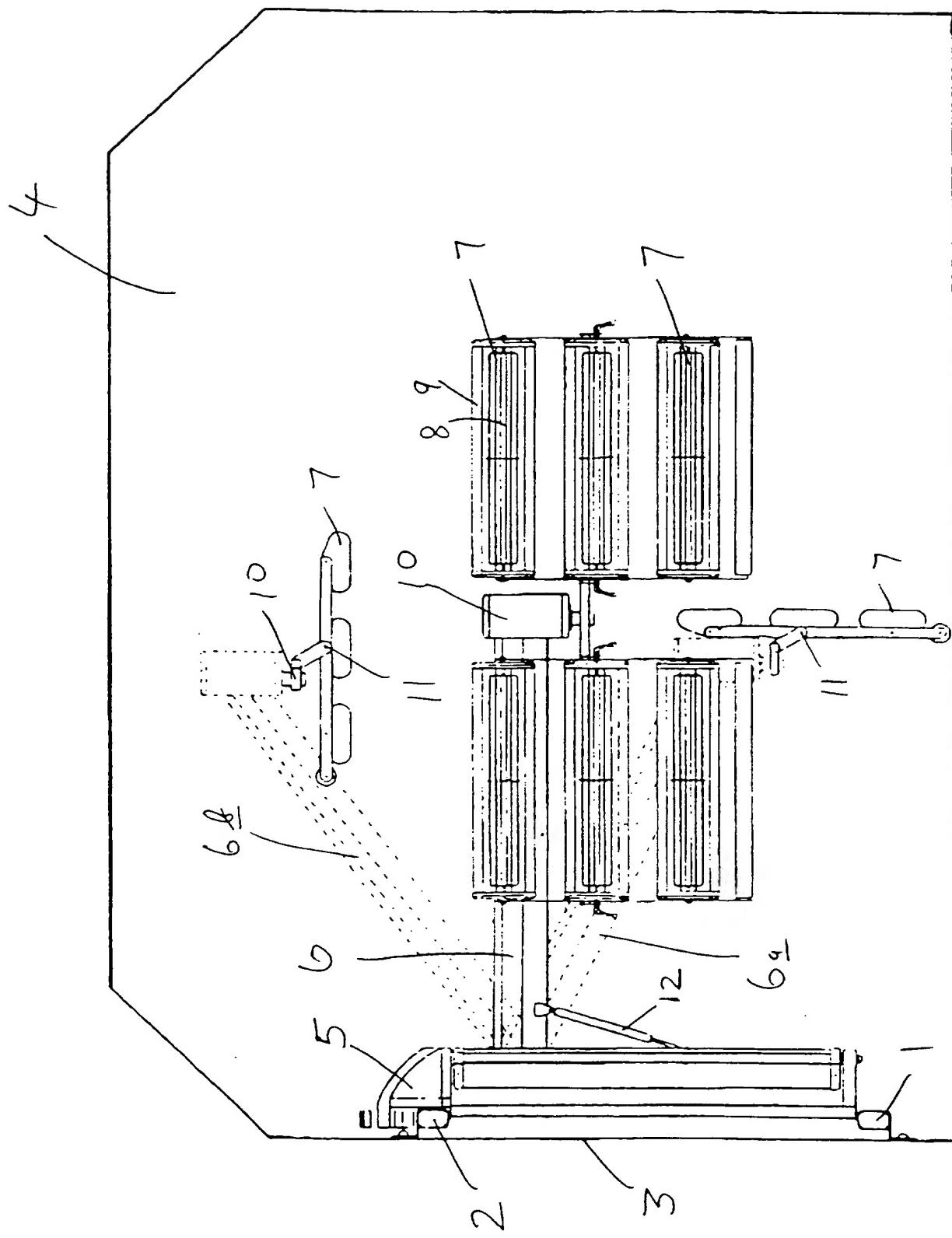
Urquhart-Dykes & Lord  
St Nicholas Chambers, Amen Corner,  
NEWCASTLE-UPON-TYNE, NE1 1PE, United Kingdom

## (54) Spray booth paint curing apparatus

(57) Apparatus, suitable for use within a spray booth, for drying or curing protective or decorative coatings, includes a linear track (1, 2) for mounting generally horizontally on an inner wall (3) of the spray booth (4), a carriage (5) for mounting for movement along the track, at least one short-wave infra-red heater (7) mounted on the carriage for movement towards and away from the track, and ultrasonic distance-measurement means to determine the distance of the heater from the surface to be irradiated.



GB 2 306 210 A



**2306210**

Spray booth paint curing apparatus.

The present invention is concerned with apparatus for use in the automotive refinish industry for drying or curing protective or decorative coatings which have been applied to restore damaged paintwork. It is particularly concerned with apparatus for carrying out that operation within a spray booth.

The restoring of damaged automotive paintwork, for example applied to one or two panels of a car, involves the application of several layers of material, each of which must then be dried or cured before the application of the next layer. The base coats and lacquers are applied by the use of sprayguns in a spray booth and the subsequent drying or curing is then carried out within the booth. However that subsequent step is not making

use of the booth for its main intended function, that is for spraying, and thus efficient use of the combined resources of the qualified paint sprayer and the booth demands that the drying function should be carried out in the least time compatible with good quality refinishing.

It is an object of the present invention to provide improved paint curing apparatus which may be used within a spray booth with the aim 10 of improving the curing step.

The apparatus according to the present invention comprises a linear track adapted to be mounted in a generally horizontal direction along an interior wall of a paint spray booth, a carriage for mounting 15 for movement along said track, at least one short-wave infra-red heater mounted upon said carriage for movement towards and away from the track, and ultrasonic distance-measurement means adapted to determine the distance of said heater from 20 a surface to be irradiated.

It is a characteristic feature of the apparatus of the present invention that it is based upon a linear track for mounting on an inner wall of the booth. Thus it is not necessary, as with 25 some prior drying systems, to design and/or build

the spray booth around the desired heating system; the apparatus according to the invention is adapted for retrofitting within an existing spray booth. Moreover, the track enables the heaters to be  
5 brought into use, and manoeuvred, along a wall of the booth, thus avoiding the disadvantages of overhead heaters, not the least of which is that any dust or overspray which may have settled on the heaters when they are not in use may then  
10 be deposited upon the vehicle being refinished.

Deployment of the heaters entails moving the carriage along the track. The moving of the carriage is preferably effected manually but as an alternative, the moving of the carriage along  
15 the track may be powered, for example electrically, hydraulically, pneumatically or by mechanical means. Movement of the carriage allows the heater or heaters to be placed in the optimum position relative to the length of the vehicle in the booth,  
20 depending upon the area of the vehicle being treated.

The mounting of the heater or heaters upon the carriage is such as to permit the heater(s) to be moved towards and away from the painted surface to be cured. In a preferred form of the  
25 invention, the heater(s) is/are mounted at the

outer end of an arm, pivoted at its inner end about a generally vertical pivot upon the carriage. Preferably the heater(s) is/are pivoted upon the arm, also about a generally vertical pivot, 5 to allow the heat to be directed at the painted surface under treatment. The outer end of the arm, and the heater(s) thereon, may if desired be provided with additional support, for example one or more wheels or rollers.

10 The positioning of the heater(s) may be further improved, when they are mounted upon an arm as aforesaid, by providing also a generally horizontal pivot, in addition to the generally vertical pivot, at one or both of the ends of the arm. This will 15 then allow the arm to swing upwardly, and in turn the heater(s) to be directed downwardly, when it is desired to treat the roof, bonnet or boot surface of the vehicle. The raising of the arm may be power-assisted, for example by means of 20 a gas strut.

The form of heating used in the apparatus according to the present invention is short-wave infra-red irradiation of the painted surface. The heater preferably comprises an elongate tubular 25 element, preferably orientated in a generally

horizontal direction. It is particularly preferred to employ at least two heaters, for example four or six heaters, disposed in an array which is symmetrical both horizontally and vertically.

5 In use of the apparatus of the present invention, the distance of the heater(s) from the surface being irradiated is determined ultrasonically. It is thus possible to locate the heater(s) at the optimum distance at which the curing of the  
10 paint may be completed in the minimum time compatible with achieving a good-quality surface finish. An indication of determined distance may if desired be displayed but it is preferred to display only an indication that the distance is, or is not,  
15 within predetermined acceptable limits. For example, green or red lights respectively may indicate the acceptability or otherwise of the distance. In one form of the invention, two or more ultrasonic sensors may be used, to take account of a larger  
20 area under treatment.

If desired, the ultrasonic distance-measurement means may be incorporated in an electronic interlock, such that, if a surface is closer to the heater(s) than is desirable or safe, the heater(s) is/are  
25 unable to operate.

The invention will now be further described, by way of example only, with reference to the accompanying drawing, which illustrates one preferred embodiment of the spray booth paint curing apparatus according to the present invention, viewed from one end of a booth in which it is installed.

In the illustrated apparatus, a pair of linear rails 1, 2 are secured horizontally upon a side wall 3 of a spray booth 4 and together form a track along which a carriage 5 is able to be moved. A support arm 6 extends generally outwardly from the carriage 5 towards the centre of the booth. An array of six short-wave infra-red heaters 7, 7, each of which comprises an elongate element 8 backed by a reflector 9, is pivotted at the outer end of the support arm 6 about a vertical pivot 10 and a horizontal pivot 11.

The arm itself is also mounted upon vertical and horizontal pivots on the carriage 5, by means of which pivots the arm may adopt a wide range of orientations. For raising and lowering of the arm, the weight of the arm and of the heater array is counterbalanced by a gas strut 12.

By movement of the arm about its horizontal pivot, the heaters may be directed more precisely

at the vehicle at the height of the panel or panels to be irradiated. The arm is shown in broken line at 6a in a position where the panel to be treated is low down on the vehicle. In the broken line position 6b of the arm, the arm has been swung upwardly and the heater array has been directed downwardly in order to irradiate one of the horizontal surfaces of the vehicle.

Movement of the heater array towards and away from the side panels of the vehicle is readily achieved by swinging the arm 6 about its vertical pivot, while redirecting the heaters by movement about the pivot 10. The setting of the precise distance of the heaters from the panels is achieved with the aid of an electronic sensor (not shown) on the heater array.

CLAIMS

1. Paint curing apparatus for use within a spray booth, comprising a linear track adapted to be mounted in a generally horizontal direction along an interior wall of a paint spray booth, a carriage for mounting for movement along said track, at least one short-wave infra-red heater mounted upon said carriage for movement towards and away from the track, and ultrasonic distance-measurement means adapted to determine the distance of said heater from a surface to be irradiated.

2. Paint curing apparatus as claimed in Claim 1, wherein movement of the carriage along the track is effected manually.

15 3. Paint curing apparatus as claimed in Claim 1, wherein movement of the carriage along the track is powered electrically, hydraulically, pneumatically or by mechanical means.

20 4. Paint curing apparatus as claimed in any of the preceding claims, wherein the heater(s) is/are mounted at the outer end of an arm which at its inner end is pivoted about a generally vertical pivot upon the carriage.

5. Paint curing apparatus as claimed in  
Claim 4, wherein the heater(s) is/are pivoted about  
a generally vertical pivot upon the arm.

5 6. Paint curing apparatus as claimed in  
Claim 4 or Claim 5, wherein the outer end of the  
arm is provided with additional support.

7. Paint curing apparatus as claimed in  
Claim 6, wherein said additional support comprises  
one or more wheels or rollers.

10 8. Paint curing apparatus as claimed in any  
of Claims 4 to 7, having also a generally horizontal  
pivot at one or both of the ends of the arm.

9. Paint curing apparatus as claimed in  
Claim 8, comprising a gas strut to assist raising  
15 of the arm about a generally horizontal pivot at  
the inner end of the arm.

10. Paint curing apparatus as claimed in any  
of the preceding claims, wherein the heater comprises  
an elongate tubular element.

20 11. Paint curing apparatus as claimed in  
Claim 10, wherein said elongate tubular element  
is orientated in a generally horizontal direction.

12. Paint curing apparatus as claimed in any of the preceding claims, comprising at least two said heaters, disposed in an array which is symmetrical both horizontally and vertically.

5 13. Paint curing apparatus as claimed in any of the preceding claims, wherein said ultrasonic distance-measurement means includes means to display said measured distance.

10 14. Paint curing apparatus as claimed in any of Claims 1 to 12, including means to indicate that the distance measured by the ultrasonic distance-measurement means is or is not within predetermined acceptable limits.

15 15. Paint curing apparatus as claimed in Claim 14, wherein said means to indicate comprises lights to indicate the acceptability or otherwise of the distance measured.

20 16. Paint curing apparatus as claimed in any of the preceding claims, including an electronic interlock such that, if the distance measured by the ultrasonic distance-measurement means is less than that which is desirable or safe, the heater(s) is/are unable to operate.

17. Paint curing apparatus for use within a spray booth, said apparatus being substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.



The  
Patent  
Office

12

**Application No:** GB 9619409.7  
**Claims searched:** 1-17

**Examiner:** Steve Waller  
**Date of search:** 5 December 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F4G G9BT, G9RC

Int Cl (Ed.6): F26B 3/30

Other: ONLINE: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	WO 95/07443 A1 (HERAEUS NOBLELIGHT)	

- X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
& Member of the same patent family

- A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.